

AMENDED CLAIMS
received by the International Bureau on 13 April 2006 (13.04.06)

1. A wiper fluid heater apparatus, comprising:
a heat exchanger having a wiper fluid inlet to allow wiper fluid to enter the
5 heat exchanger and a wiper fluid outlet to allow the wiper fluid to exit the heat
exchanger; and
a coolant passage traversing through the heat exchanger having a coolant
inlet and a coolant outlet, the coolant inlet and coolant outlet operably coupled to an
engine's coolant system to allow passage of engine coolant through the heat
10 exchanger, wherein the wiper fluid directly contacts the coolant passage.
2. The apparatus of claim 1, wherein the coolant inlet receives coolant
directly from the engine block.
3. The apparatus of claim 1, wherein the coolant inlet receives coolant
directly from a water pump.
- 15 4. The apparatus of claim 1, wherein the heat exchanger further
comprises a first end and a second end.
5. The apparatus of claim 4, wherein the coolant inlet and the wiper fluid
outlet are located on the first end and the coolant outlet and wiper fluid inlet are
located on the second end to insure coolant flow and washer fluid flow are in
20 opposite directions.
6. The apparatus of claim 1, wherein the coolant inlet is operably coupled
to a heater core inlet and the coolant outlet is operably coupled to a heater core
outlet to create a parallel engine coolant flow with the heater core.
7. The apparatus of claim 6, further comprising a thermostat operably
25 coupled to the wiper fluid heater to control when the wiper fluid heater is powered on.
8. The apparatus of claim 4, wherein the heat exchanger further
comprises a reservoir and wherein the coolant passage has at least one extruded fin
within the heat exchanger.
9. The apparatus of claim 8, wherein the wiper fluid outlet is operably
30 connected to the reservoir and the wiper fluid inlet is operably connected to the heat
exchanger to input the wiper fluid onto the coolant passage.
10. The apparatus of claim 9, wherein the coolant passage further
comprises channels defined by fins that touch an outside wall of the heat exchanger

point, the fins having an opening between every other fin allowing the wiper fluid to pass to the adjacent channel.

11. The apparatus of claim 4, wherein the coolant passage has at least one extruded fin within the heat exchanger.

12. The apparatus of claim 11, wherein the coolant passage further comprises channels defined by fins that touch an outside wall of the heat exchanger point, the fins having an opening between every other fin allowing the wiper fluid to pass to the adjacent channel.

13. The apparatus of claim 12, wherein the wiper fluid inlet is operably coupled to an inlet channel and the wiper fluid outlet is operably coupled to an outlet channel.

14. The apparatus of claim 13, further comprising a thermal barrier between the inlet channel and the outlet channel.

15. A window washing system for a motor vehicle, comprising:
nozzle means located adjacent a vehicle window for directing washer fluid against the window;

a chamber for containing washer fluid;

a heat exchanger having an inlet connected to said chamber and an outlet connected to said nozzle means, the heat exchanger having a coolant passage plate and a first wiper fluid plate;

pumping means for transferring washer fluid from said chamber into said heat exchanger and from said heat exchanger to said nozzle means; and

means for circulating coolant from a motor cooling system into the heat exchanger with the washer fluid inside to thereby heat the fluid.

16. The system of claim 15, wherein the first plate and coolant plate are held together by a fastening means.

17. The system of claim 16, wherein the coolant passage plate allows the passage of coolant from the heat exchanger inlet to the heat exchanger outlet.

18. The system of claim 17, wherein the first wiper fluid plate contains a wiper fluid passage to route wiper fluid through the first plate to transfer heat from the engine coolant.

19. The system of claim 18, wherein a second wiper fluid plate is held to the coolant passage plate by a fastening means.

20. The system of claim 19, wherein the coolant passage plate further comprises a wiper fluid passage for wiper fluid to pass from the first wiper plate to the second wiper plate.

5 21. The system of claim 20, wherein the coolant passage plate has a plurality of wiper fluid plates held to it by a fastening means.

22. The system of claim 21, wherein each wiper fluid plate has a cover plate to enclose the wiper fluid passages.

10 23. The system of claim 18, wherein the wiper fluid passage is a spiral passage.

24. The system of claim 18, wherein the wiper fluid passage contains imperfections to create fluid turbulence.

15 25. The system of claim 15, wherein the heat exchanger further comprises a coolant plate wherein an upper surface of the coolant plate has a coolant passageway for the motor coolant and a lower surface has a wiper fluid passageway for the wiper fluid.

26. The system of claim 25, wherein the coolant passageway is a spiral passage.

20 27. The system of claim 26, wherein the wiper fluid passageway is a spiral passage.

28. The system of claim 27, wherein the motor coolant and the wiper fluid flow in different directions within their respective passageways.

25 29. The system of claim 15, further comprising a check valve operably connected to the wiper fluid inlet to prevent wiper fluid from traversing back to the chamber.

30. The system of claim 15, wherein the chamber is located at a height above the heat exchanger.

31. The system of claim 15, further comprising a pressure valve, wherein when the pressure valve is activated a piston is activated and shuts off the flow of the coolant into the heat exchanger.

32. A wiper fluid heater apparatus, comprising:
a heat exchanger having a wiper fluid inlet to allow wiper fluid to enter the heat exchanger and a wiper fluid outlet to allow the wiper fluid to exit the heat exchanger, the heat exchanger having a bypass passage; and

a coolant passage traversing through the heat exchanger having a coolant inlet and a coolant outlet, the coolant inlet and coolant outlet operably coupled to an engine's coolant system to allow passage of engine coolant through the heat exchanger.

33. The apparatus of claim 32, further comprising a thermal actuator which actuates a gate routing the engine coolant flow to the bypass passage from the coolant passage when the wiper fluid becomes to hot.

34. The apparatus of claim 33, wherein the heat exchanger has a first chamber and a second chamber.

35. The apparatus of claim 34, wherein the coolant inlet is operably coupled to the first chamber and the coolant outlet is operably coupled to the second chamber.

36. The apparatus of claim 35, wherein the wiper fluid flows into the first chamber and then flows into the second chamber.

37. The apparatus of claim 35, wherein the first chamber pre-heats the wiper fluid and the second chamber heats the wiper fluid to a useable level.

38. The apparatus of claim 37, wherein the coolant passages traverses through the first and second chamber.

39. The apparatus of claim 34, wherein the heat exchanger further comprises a third chamber.

40. The apparatus of claim 39, wherein the coolant passage traverses through the first chamber.

41. The apparatus of claim 40, wherein the wiper fluid inlet is operably coupled to the second chamber where the wiper fluid is pre-heated by the first chamber.

42. The apparatus of claim 41, wherein the wiper fluid outlet is operably coupled to the third chamber where the wiper fluid remains heated by the first chamber.

43. The apparatus of claim 42, wherein the first chamber is smaller than the second chamber.

44. The apparatus of claim 34, wherein the coolant passage traverses through the first chamber.

45. The apparatus of claim 44, wherein the wiper fluid inlet is operably coupled to the second chamber where the wiper fluid is pre-heated by the first chamber.

5 46. The apparatus of claim 45, wherein the wiper fluid outlet is operably coupled to the first chamber.

47. The apparatus of claim 46, further comprising a pressure valve coupled to the wiper fluid outlet.

10 48. The apparatus of claim 47, further comprising a return wiper fluid outlet operably coupled to the second chamber, the return wiper fluid outlet operably coupled to the pressure valve.